Maharashtra State Board

Class X Maths Part-II

Geometry Answers Set-1

Q. 1 (A)

(1) Point M is the midpoint of seg AB.

$AM = \frac{1}{2} \times AB$

$\therefore AM = \frac{1}{2} \times 14$

$\therefore AM = 7$ Unit

(2) (i) $\angle d$ and $\angle e$ or (ii) $\angle c$ and $\angle f$

(3) $\frac{AB}{XY} = \frac{\boxed{BC}}{YZ} = \frac{AC}{\boxed{XZ}}$

(4) To draw $\angle ARP = 115^\circ$.

Bisect $\angle ARP$.

(5) $\sin\theta = \frac{AB}{BC}$

$\sin\theta = \frac{3}{5}$

(6) $y = 0$

Q. 1 (B)

(1) Surface area of the sphere $= 4\pi r^2$

$= 4 \times \frac{22}{7} \times 14 \times 14$

$= 4 \times 22 \times 2 \times 14$

$= 2464 \text{ cm}^2$

(2) seg PM $\perp$ chord AB

In right angled triangle Δ APM

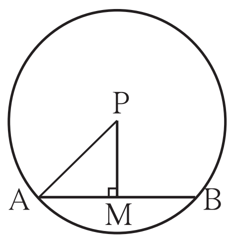
$AM^2 + PM^2 = AP^2$ …….. (by Pythagoras theorem)

$\therefore AM^2 + 6^2 = 10^2$

$\therefore AM^2 = 100 - 36$

$\therefore AM^2 = 64$

$\therefore AM = 8$ cm



The perpendicular drawn from the centre of the circle to the chord bisects the chord.

$\therefore$ AB = 2 × AM

$\therefore$ AB = 2 × 8

$\therefore$ AB = 16 cm

$\therefore$ lenght of chord AB = 16 cm.

(3) MN = 3 cm

PN = 7 cm

$\angle M = 70^\circ$

$\angle N = 110^\circ$

Q. 2 (A) (1) A (2) D (3) B (4) C

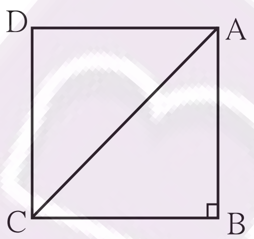
Q. 2 (B)

(1) $\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{BC}{AD}$ .... (Triangles with same base)

$\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{4}{8}$

$\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{1}{2}$

(2)



$\square$ ABCD is a square.

In right angled triangle Δ ABC,

$AC^2 = AB^2 + BC^2$ ....(by Pythagoras theorem)

$\therefore AC^2 = 16^2 + 16^2$

$\therefore AC^2 = 256 + 256$

$\therefore AC^2 = 512$

$\therefore AC = 16\sqrt{2}$

(3) Area of a sector $= \frac{1}{2} \times$ length of the arc × radius

$= \frac{1}{2} \times 55 \times 21$

$= 577.50 \text{ cm}^2$.

Q. 3 (A)

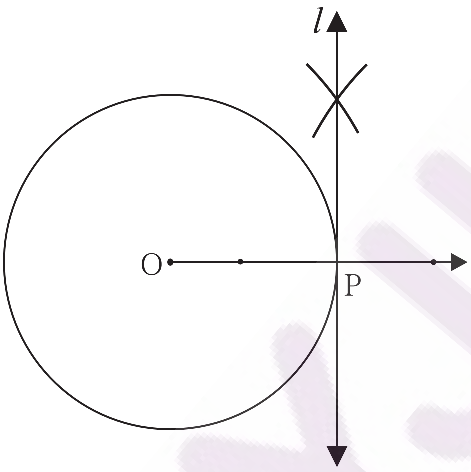
(1) $\angle LMN = \frac{1}{2}\,[m(\text{arc } LN) - \boxed{m(\text{arc } PQ)}]$

$\therefore \angle LMN = \frac{1}{2}\,[\boxed{110^\circ} - 50^\circ]$

$\therefore \angle LMN = \frac{1}{2} \times \boxed{60^\circ}$

$\therefore \angle LMN = \boxed{30^\circ}$

(2)



(3) Capacity of the tank = Volume of cylindrical tank

$= \pi r^2 h$

$= \frac{22}{7} \times 2.8 \times 2.8 \,\boxed{3.5}$

$= \boxed{86.24}\ m^3$

$= \boxed{86.24} \times 1000$ litre

$= \boxed{86240}$ litre

Q. 3 (B)

(1) In Δ DEF,

line PQ || side EF

$\therefore \frac{DP}{PE} = \frac{DQ}{QF}$

$\therefore \frac{2.4}{7.2} = \frac{1.8}{QF}$

$\therefore QF = \frac{7.2 \times 1.8}{2.4}$

$\therefore QF = 5.4$

(2) By tangent secant theorem,

$PQ^2 = PS \times PR$

$12^2 = PS \times 8$

$PS = \frac{144}{8}$

$PS = 18$

(3) $1 + \tan^2\theta = \sec^2\theta$

$1 + \tan^2\theta = \left(\frac{25}{7}\right)^2$

$\therefore \tan^2\theta = \frac{625}{49} - 1$

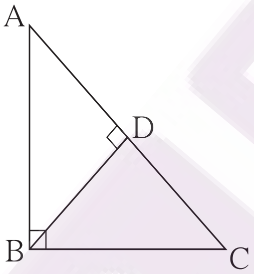
$\therefore \tan^2\theta = \frac{625-49}{49}$

$\therefore \tan^2\theta = \frac{576}{49}$

$\therefore \tan\theta = \frac{24}{7}$

Q. 4

(1)



Given : In Δ ABC, $\angle$ ABC = 90°

To Prove : $AC^2 = AB^2 + BC^2$

Construction : Draw seg BD perpendicular on side AC. A–D–C.

Proof : In right angled Δ ABC,

seg BD $\perp$ hypotenuse AC ...... (Construction)

$\therefore \Delta ABC \sim \Delta ADB \sim \Delta BDC$ ...(Similarity of right angled triangles)

$\Delta ABC \sim \Delta ADB$

$\therefore \frac{AB}{AD} = \frac{BC}{DB} = \frac{AC}{AB}$ ...... (corresponding sides)

$\therefore \frac{AB}{AD} = \frac{AC}{AB}$

$\therefore AB^2 = AD \times AC$ .... (I)

$\Delta ABC \sim \Delta BDC$

$\frac{AB}{BD} = \frac{BC}{DC} = \frac{AC}{BC}$ .... (corresponding sides)

$\therefore \frac{BC}{DC} = \frac{AC}{BC}$

$\therefore BC^2 = AC \times DC$ .... (II)

Adding (I) and (II)

$AB^2 + BC^2 = AD \times AC + AC \times DC$

$\therefore AB^2 + BC^2 = AC\,(AD + DC)$

$\therefore AB^2 + BC^2 = AC \times AC$ ...... (A-D-C)

$\therefore AB^2 + BC^2 = AC^2$

(2) A(-4, -7), B(-1, 2), C(8, 5), D(5, -4)

According to distance formula,

$AB = \sqrt{\left[-1-(-4)\right]^2 + \left[2-(-7)\right]^2}$

$\therefore AB = \sqrt{3^2 + 9^2}$

$\therefore AB = \sqrt{9+81}$

$\therefore AB = \sqrt{90}$ ...... (1)

$BC = \sqrt{\left[8-(-1)\right]^2 + (5-2)^2}$

$\therefore BC = \sqrt{9^2 + 3^2}$

$\therefore BC = \sqrt{81+9}$

$\therefore BC = \sqrt{90}$ ...... (2)

$CD = \sqrt{(5-8)^2 + (-4-5)^2}$

$\therefore CD = \sqrt{(-3)^2 + (-9)^2}$

$\therefore CD = \sqrt{9+81}$

$\therefore CD = \sqrt{90}$ .... (3)

$AD = \sqrt{\left[5-(-4)\right]^2 + \left[-4-(-7)\right]^2}$

$\therefore AD = \sqrt{9^2 + 3^2}$

$\therefore AD = \sqrt{81+9}$

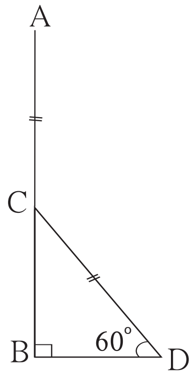
$\therefore AD = \sqrt{90}$ .... (4)

From (1), (2), (3) and (4)

AB = BC = CD = AD

$\therefore \square$ ABCD is a rhombus.

(3)



AB = Height of the tree

Tree is broken at C

AC = CD .... (1)

$\angle$ CDB = 60°

BD = 20 m

In right angled Δ CBD,

$\tan 60^\circ = \frac{CB}{BD}$

$\sqrt{3} = \frac{CB}{20}$

$CB = 20\sqrt{3}$ m.

$\sin 60^\circ = \frac{CB}{CD}$

$\frac{\sqrt{3}}{2} = \frac{20\sqrt{3}}{CD}$

$CD = \frac{2 \times 20\sqrt{3}}{\sqrt{3}}$

CD = 40 m.

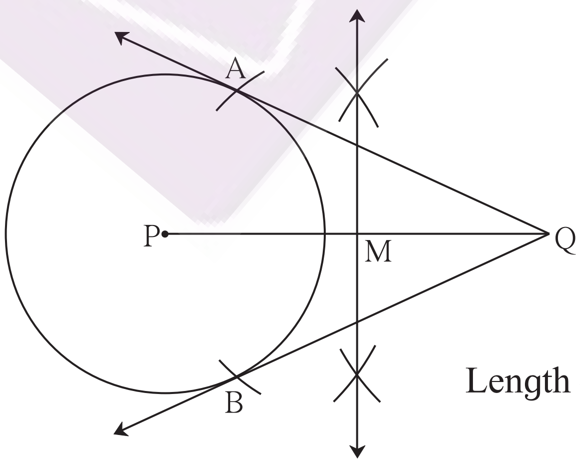
$\therefore$ AC = CD = 40 m. .... (From (1))

AB = AC + CB

AB = $(40 + 20\sqrt{3})$ m.

$\therefore$ height of the tree = $(40 + 20\sqrt{3})$ m.

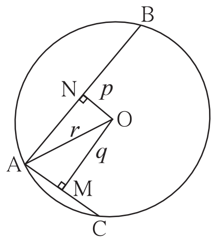
(4)



Length of tangent segment = 4.8 cm $\pm$ 0.2 cm

Q. 5

(1)



Let AC = a then AB = $2a$

seg OM ⊥ chord AC, seg ON ⊥ chord AB.

AM =MC = $\frac{a}{2}$ and AN = NB = a

In Δ OMA and Δ ONA, By theorem of Pythagoras,

$AO^2 = AM^2 + MO^2$

$AO^2 = \left(\frac{a}{2}\right)^2 + q^2$ .... (1)

$AO^2 = AN^2 + NO^2$

$AO^2 = a^2 + p^2$ .... (2)

From equation (1) and (2)

$\left(\frac{a}{2}\right)^2 + q^2 = a^2 + p^2$

$\frac{a^2}{4} + q^2 = a^2 + p^2$

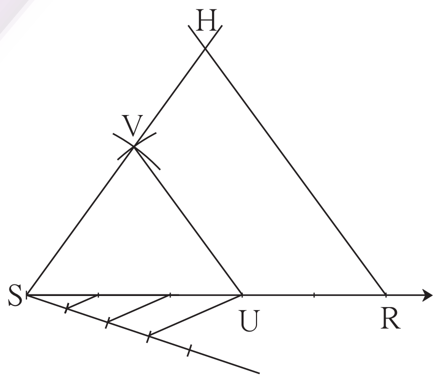
$a^2 + 4q^2 = 4a^2 + 4p^2$

$4q^2 = 3a^2 + 4p^2$

$4q^2 = p^2 + 3(a^2 + p^2)$

$4q^2 = p^2 + 3r^2$ .... (In Δ ONA, $r^2 = a^2 + p^2$)

(2)



Q. 6

(1) $r = 6.6$ cm

length of corn $= h = 11.2$ cm

$$l^2 = h^2 + r^2$$
$$l^2 = (11.2)^2 + (6.6)^2$$
$$l^2 = 125.44 + 43.56$$
$$l^2 = 169$$
$$l = 13$$

Curved surface area of cone shaped corn $= \pi r l$

$= 3.14 \times 6.6 \times 13$

$= 269.412 \text{ cm}^2$

Number of kernels $=$ curved surface area $\times 2$

$= 269.412 \times 2$

$= 538.824$

$\therefore$ average no. of kernels on the corn $= 539$.

(2) Proof : $\frac{l(AD)}{l(PS)} = \frac{l(DC)}{l(SR)}$ $\quad \therefore \frac{l(AD)}{l(DC)} = \frac{l(PS)}{l(SR)}$

According to angle bisector theorem, $\frac{l(AD)}{l(DC)} = \frac{l(AB)}{l(BC)}$; $\frac{l(PS)}{l(SR)} = \frac{l(PQ)}{l(QR)}$

$\therefore \frac{l(AB)}{l(BC)} = \frac{l(PQ)}{l(QR)}$ and $\angle ABC \cong \angle PQR$ ..... (Given)

$\Delta ABC \sim \Delta PQR$ .... (SAS Test)